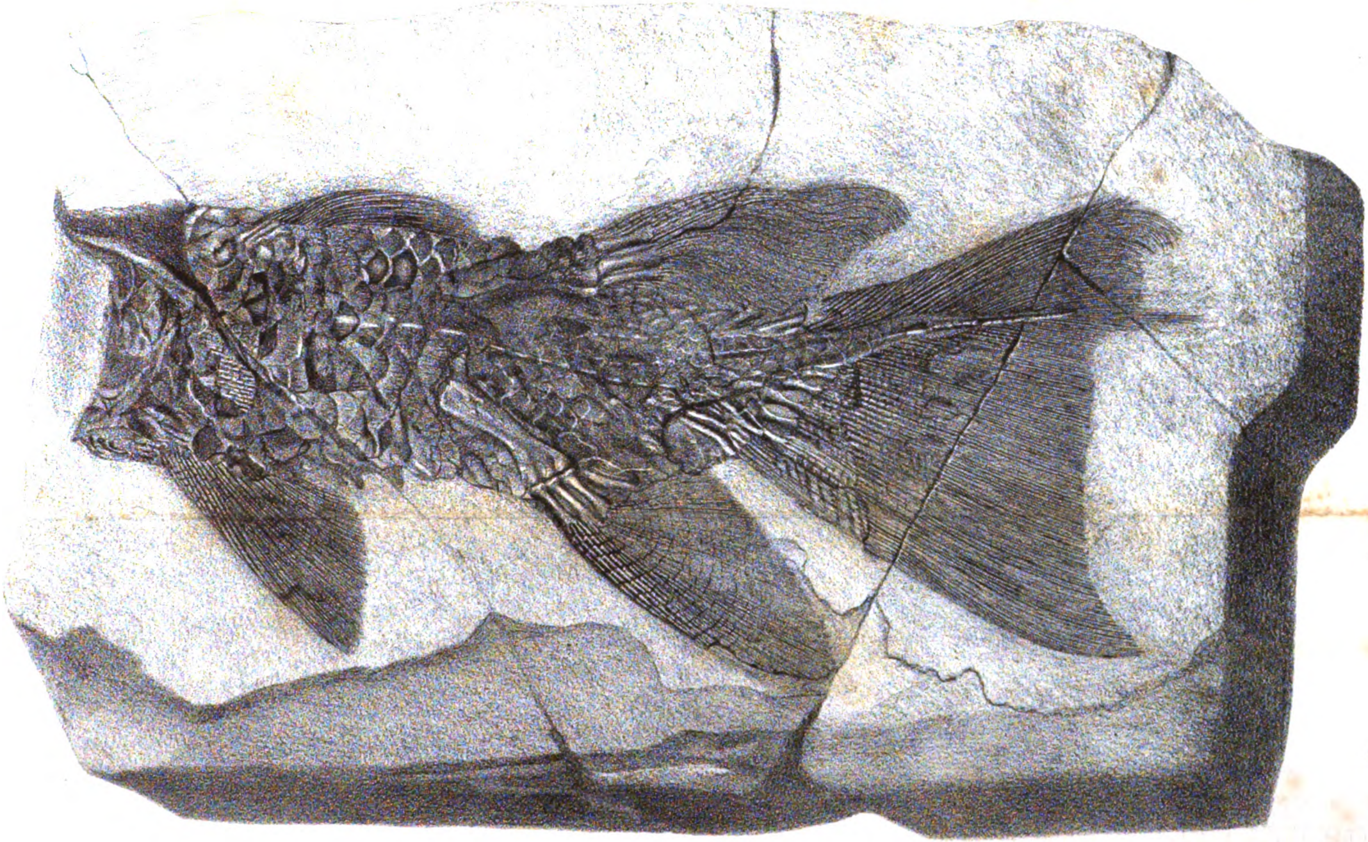
Geological Survey of the United Kingdom.

DECADE X. PL. 5.

TRISTICHOPTERUS.

(Devonian)

1



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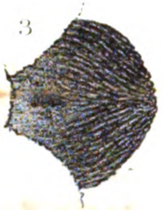

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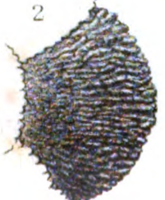

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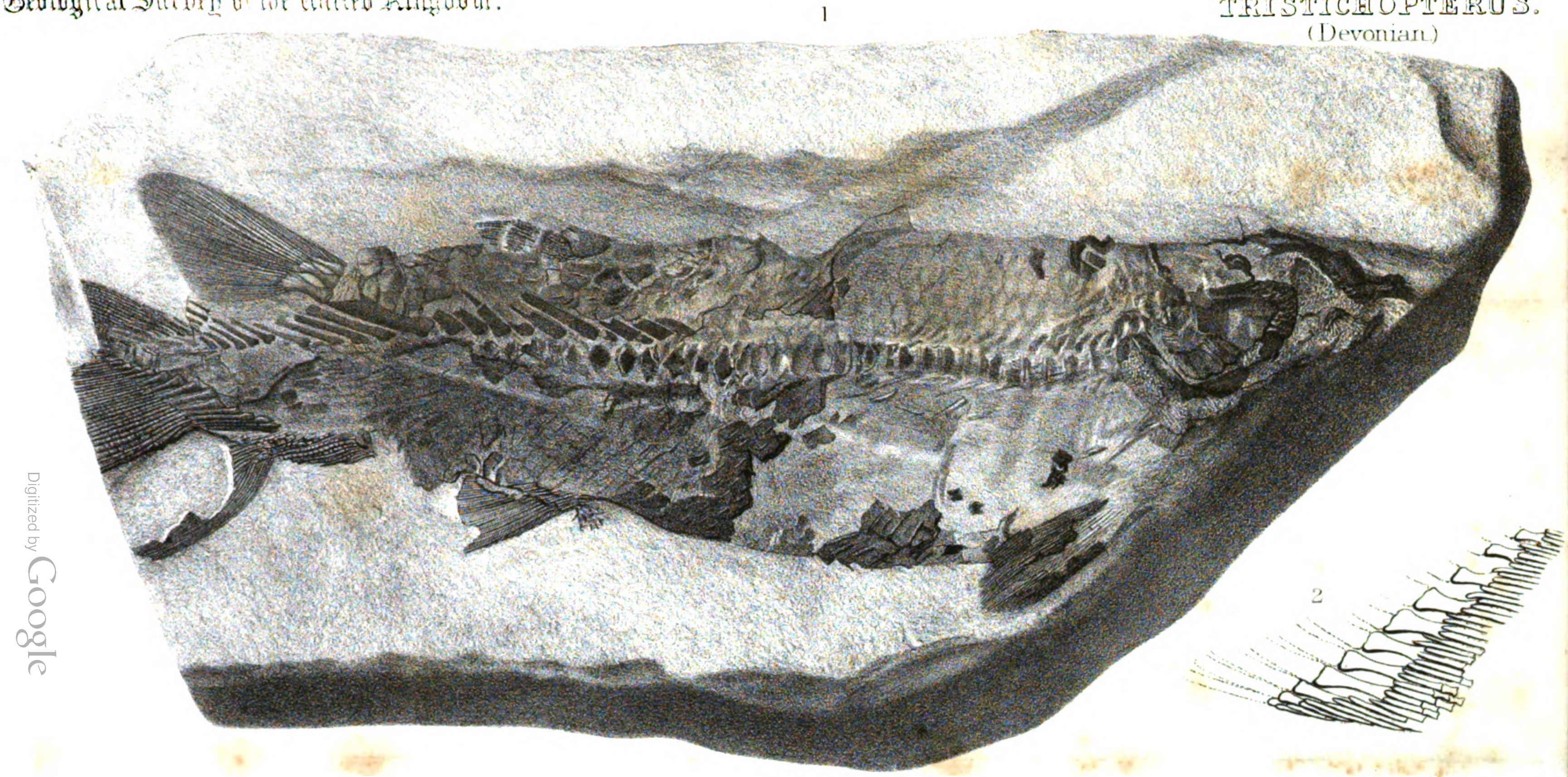

TRISTICHOPTERUS ALATUS. _ *Egerton.*

[illegible]

Day & Son, Lith^rs to the Queen

BRITISH FOSSILS.

DECADE X. PLATES IV. AND V.

TRISTICHOPTERUS ALATUS.

[Genus TRISTICHOPTERUS.* EGERTON. (Sub-kingdom Vertebrata. Class Pisces. Order Goniolepidoti. Family Cœlacanthi.) Body fusiform. Cranial bones sculptured. Two dorsal fins ; one anal fin ; the rays of the second dorsal and the anal fin springing from three strong interspinous bones in each. Caudal fin springing from eight or nine similar bones. Vertebral centres ossified and prolonged through the upper lobe of the caudal fin.]

Tristichopterus alatus. SP. UNICA.

This is one of the many interesting additions made to the fossil Fauna of Scotland by the zeal and intelligence of Mr. Peach. Two specimens only have been obtained, one showing the general form of the fish, with the exception of the extremities of the head and tail, the other, with its counterpart, exhibiting in perfect preservation the structural and other characters of the fins and tail. The expanse of the latter and the opposition of the second dorsal to the anal fin are characters which might lead one to refer this form to the genera *Diplopterus* or *Gyroptychius*, but a rigid examination of the specimens convinces me that it formed a member of the Cœlacanthoid family, although presenting some important discrepancies from the other genera of that family. The points of resemblance are seen in the number and position of the fins, the curvilinear outline of the scales, and the prolongation of the central portion of the tail. The differences consist in the structural details of the fins and the ossification of the vertebral centres ; but in these respects the deviation from the *Sauroidei-dipterini* is quite as great as from the *Cœlacanthi.*

Description.—The more perfect of the two specimens measures seven and a half inches in length ; if to this we add two and a quarter inches, the dimensions of the tail supplied by the second specimen, and three-quarters of an inch for the absent portion of the head, the entire length of the fish will be ten and a half inches. The depth at the greatest diameter is two inches. The body is irregularly fusiform, the dorsal line being less curved than the ventral outline, and the anterior half of the body more obtuse than the caudal portion. The bones of the head (with the exception of a small fragment of the operculum) are wanting, but the impressions distinctly left upon the matrix show that they were sculptured in rather a bold pattern, not unlike the ornament on the cranial bones of some of the *Holoptychii*, and consequently differing in this respect from the corresponding parts in *Dipterus.* The pectoral fins are very indistinctly seen. They appear to have had a short obtuse lobe forming the base, and extending therefrom a set of numerous fin-rays more elongated than those forming the pectoral fin in *Dipterus.* The small anterior dorsal fin is situated at the commencement of the last third of the body, and is opposed to the ventral fins. The latter are broad and composed of numerous rays expanding from a short lobate base. Both these and the pectoral fins differ from the corresponding organs in *Dipterus* in having more numerous and longer rays.

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* From τρεῖς tres, στίχη series, πτερὸν ala.

The structure of the other fins is very singular and requires a more detailed description. The second dorsal fin is placed immediately opposite the anal fin, and resembles it so closely that one description will serve for both. In each of these fins the component rays spring from three interspinous bones, and these are attached to a single broad spinous apophysis. The latter bone is probably a composite one, formed by the union of three or more spines. The interspinous osselets have cylindrical shafts expanded at each extremity, the one for attachment to the vertebral spine, the other for affording a base for the insertion of the fin-rays. In the anal fin the anterior bone of the triplet is shorter than the others and than the corresponding bone in the dorsal fin. The fin-rays springing from the first bone are the strongest. The anterior ones are the shortest and they lengthen in succession until the maximum extent of the fin is attained. They are single at first, but bifurcate in the distal part of the fin. The transverse joints are numerous. The group abutting upon the first interspinous bone contains about six rays. The second bone carries about eight rays, more slender than the former and more frequently subdivided. The anterior ray of this group is the longest, the subsequent ones decreasing in length in succession. The third bone gives attachment to at least a dozen rays, finely fimbriated, and forming the posterior fan-like portion of the fin. The integuments extended over the interspinous bones as far as the commencement of the true fin-rays, thus forming the lobate base so characteristic of the fins in all the Cœlacanthoid fishes. The upper lobe of the tail contains numerous rays, the anterior ones being short and fulcral, forming a marginal fringe along the upper edge of the fin. A few of the upper fin-rays are given off from a set of short neurapophyses, but the terminal rays seem to abut upon the vertebral axis. This is prolonged through and beyond the caudal fin, and is furnished at its extremity with a few fine rays forming a kind of supplemental fin projecting beyond the terminal margin of the normal caudal fin. This peculiar form of tail is common to many of the Cælacanthoid genera, and is most fully developed in the genus *Cœlacanthus* from the Permian and Carboniferous beds. It differs from the "diphycercal tail" of Prof. M'Coy, in which the upper and lower rays of the true caudal fin form the terminal point. This form is characteristic of the genera *Diplopterus* and *Gyroptychius* belonging to the *Sauroidei-dipterini.* The lower lobe of the tail is constructed upon a plan similar to that above described as occurring in the second dorsal and anal fins, but the interapophyseal osselets are more numerous. They are eight or ten in number, and each carries four or five rays. These rays are stouter than those of the upper lobe and are more frequently jointed and subdivided; the rays, above the upper interapophysis, forming the central area of the tail, impinge upon the lower periphery of the vertebral column, and decrease successively in length so as to form a vertical termination to this lobe of the tail. The condition of the vertebral axis in this fish forms a remarkable exception to the general law hitherto applicable to the greater part (if not to all) the fishes of the Old Red Sandstone, and to all the *Cœlacanthi* hitherto described. If we except the genus *Dipterus* (some specimens of which show a tendency to ossification in the caudal region) all the Devonian genera have been considered *Notochordal* fishes, that is to say, the *chorda dorsalis* has persisted in its embryonic condition without any trace of segmentation. In the present subject, however, the whole of the vertebral axis has left its impression distinctly on the matrix in one specimen, and in the other the vertebræ of the caudal region are preserved entire. There can be no doubt entertained therefore that in this genus the ossification and segmentation of the column was complete, in which respects it stands alone among the contemporaneous fishes. The scales more nearly resemble those of *Dipterus* than any other, but the surface ornament is differently arranged. The enlarged representations of two scales, one from the flank, the other from the lateral line, most carefully drawn by the skilful pencil of Mr. Dinkel, show the characters more clearly than any description can do. The posterior margins of the scales are all curvilinear, differing in this respect from *Gyroptychius*.*

Affinities.—In assigning this new form to the Cœlacanthoid family, I have been mainly influenced by its resemblance in many respects to *Dipterus*. The latter genus was arranged by Professor Agassiz with the *Sauroidei-dipterini*, but I have long ago seen sufficient reasons for considering it a Cœlacanth, approximating more nearly to *Glyptolepis* and *Holoptychius* than to any other genera. Professor Pander, however, in his work on Fossil Ichthyology, a publication remarkable alike for the labour it evinces and the extraordinary beauty of the illustrations, has issued a monograph on the genus *Dipterus*, in which he disagrees with this arrangement (first published by Professor M'Coy), and seeks to establish a new family for its reception, which he designates "*Ctenodipterini.*" Hugh Miller, so long ago as the year 1848,† made known the curious discovery that the fossil crania named by Professor Agassiz "*Polyphractus*," belonged to the genus *Dipterus*, and furthermore, that the palatal teeth called "*Ctenodus*" by the same author, constituted the dental apparatus of the same genus. Professor Pander seems to have arrived at the same conclusion in 1858, not being aware of the previous discoveries of Hugh Miller, whose claim to priority, however, he acknowledges in a postcript. At the same time, Hugh Miller exposed the fallacy of assigning two anal fins to *Dipterus*, proving the so-called anterior anal fin to be one of a pair of ventrals. Professor Pander entertains the same opinion, but does not allude to Hugh Miller's correction, nor does Professor M'Coy seem to have been aware of it, as he describes the genus as having two anals. The genera *Osteolepis*, *Diplopterus*, and *Glyptolepis* are also rightly deprived of the anterior anal fin in Professor Pander's publication. The term *Ctenodipterini* is intended to express the association of the dental apparatus called *Ctenodus* with the genus *Dipterus*, but it is an objectionable term, inasmuch as it suggests the idea of a Dipterian fish with Ctenoid scales. If the family is proved to be well founded, the title *Ctenodo-dipterini* would be preferable. The genera *Ceratodus* of Agassiz, and *Conchodus* and *Chirodus* of M'Coy are referred by Pander to this family. The absence of all evidence as to the dental apparatus of *Tristichopterus* is much to be regretted. On other points the affinities between this genus and *Dipterus* are so striking that they cannot be classified in separate families.

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* Professor M'Coy figures a scale (Plate 2 c. Fig. 2 a. British Palæozoic Fossils), which he describes as a scale from the back of *Gyroptychius angustus*. It very much resembles a scale of *Tristichopterus*.

† *Witness* Newspaper, December 23, 1848.

Locality.—At the meeting of the British Association at Aberdeen in 1858, Mr. Peach read a short notice of several new forms of fossil fishes discovered by himself in the north of Scotland. The subject of the present Memoir is thus alluded to: "The great " interest attaching to the next arises from its having a short " vertebral column running from head to tail, and also strong in- " ternal supports to the fin-rays. Whether these and the vertebral " column are of bone is still an open question. The scales are " large and coarse; it is about ten inches in length; and came from " the red and blistered sandstones near John o'Groat's House." The second specimen, contributing materially to the knowledge of the genus, is not mentioned by Mr. Peach. Both these specimens now form part of the collection in the Museum of Practical Geology.

EXPLANATION OF PLATES IV. AND V.

Plate IV.

Fig. 1. *Tristichopterus alatus*, size of nature.
Fig. 2. Structure of the tail, magnified.

Plate V.

Fig. 1. *Tristichopterus alatus*, size of nature.
Fig. 2. Scale of the flank, magnified.
Fig. 3. Scale from the lateral line, magnified.

P. DE M. GREY EGERTON.

Oulton Park, Nov. 15, 1860.